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Applicant(s): Kinnard et al.			00-SM5-142	
Application No. 10/071,908	Filing Date February 18, 2005	Examiner Zervigon, Rudy	Customer No. 23413	Group Art Unit 1763
Invention: REACTOR ASSEMBLY AND PROCESSING METHOD				
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00-SM5-142

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	Kinnard et al.)	
)	Group Art Unit: 1763
Serial No.:	10/071,908)	
)	
Filed:	February 8, 2002)	Examiner: Zervigon, Rudy
)	
For:	REACTOR ASSEMBLY AND)	
	PROCESSING METHOD)	

Assistant Commissioner for Patents
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APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real party in interest in this Appeal is Axcelis Technologies, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-21 and 32-36 are pending in the application and stand finally rejected. Claims 1-21 and 32-36, as they currently stand, are set forth in Section IX below. Appellants hereby appeal the final rejection of Claims 1-21 and 32-36.

IV. STATUS OF THE AMENDMENTS

No amendments have been filed subsequent to the final rejection dated June 20, 2005. All prior amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention is generally directed to cross flow reactor assemblies. In independent Claim 1, and as is generally shown in Figures 1 and 2, the reactor assembly (10) comprises a base unit (14); a chuck assembly (20); a process chamber (40); an inlet manifold assembly (60); and an exhaust manifold assembly (80). The base unit (14) is described in greater detail at paragraph [0036] and is shown in Figure 4; and the chuck assembly (20) is described in greater detail at paragraphs [0037]-[0040] and a detailed exploded view of the chuck assembly can be found in Figure 5. The process chamber (40) is described in detail at paragraphs [0041] – [0043] and is clearly shown in Figures 1, 2, and 9. The inlet manifold assembly (60) is described in detail at paragraphs [0044]-[0046] and is shown in Figures 10-12. The exhaust manifold assembly (80) is described in detail at paragraphs [0047]-[0050] and is shown in Figures 13-18.

The chuck assembly (20) is disposed in a cavity (18) of the base unit and comprises a support (22) having a surface capable of receiving a substrate.

The process chamber (40) as presented in Claim 1 comprises a top wall (42), a bottom wall, and sidewalls (44) extending therefrom substantially perpendicular to the support surface (22) of the chuck assembly (20), and a cylindrical opening extending through the bottom wall to the top wall defining a substantially cylindrically shaped interior region (see Figure 9) having a central axis extending substantially perpendicular to the support surface of said chuck assembly (20). The process chamber is coupled to the base unit.

The claimed inlet manifold assembly (60) is in fluid communication with a first sidewall opening (48) of the process chamber (40) in a selected one of the sidewalls (44) and comprises a flow-shaping portion (64) adapted to laterally elongate a gas and/or a reactant flow into the process chamber (40). The fluid communication between the inlet manifold assembly (60) and the first sidewall opening (48) of the process chamber is free from a baffle plate.

The exhaust manifold assembly (80) is in fluid communication with a second sidewall opening (50) of the process chamber (40) in the sidewall (44) diametrically opposed from the selected one of the sidewalls, wherein the first and second sidewall openings (48, 50) define an entire flow path of the gas and/or the reactant flow into and out of the process chamber (40).

In independent Claim 32, the top wall 42 of the process chamber is transparent and the reactor assembly further comprises a light source assembly in operable communication with the transparent top wall for projecting radiation into the process chamber.

The claimed cross flow reactor assemblies permit a reaction to proceed at a faster rate than conventional axial flow reactors while providing control of the substrate temperature. Since chamber volume is relatively small in the claimed cross flow configuration, residence time is minimized. Moreover, the lack of a baffle plate at the gas inlet advantageously reduces the effect of recombination of active species by reducing the surface area in contact

with the gas and reducing pressure variations upstream of the wafer. Other advantages include, but are not limited to, elimination of parasitic wafer heating or so-called “first wafer” effects normally found in baffle plate equipped axial flow reactors; higher strip rates than conventional axial flow reactors; lower manufacturing costs due to a simpler design; elimination of quartz or aluminum alloys and coatings used for inlet gas distribution; and smaller footprint due to the decreased size and vertical height. The reactor assembly is versatile and can be readily adapted for a variety of applications.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether Claims 1-4, 10-16, 21, and 32-36 are properly rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,143,079 to Halpin et al. (hereinafter “Halpin”) in view of U.S. Patent No. 5,077,875 to Hoke et al. (hereinafter “Hoke”).

2. Whether Claim 5 is properly rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Halpin et al. and Hoke et al. in view of the STIC translation of JP 02-152251 to Takagi et al. (hereinafter “Takagi”).

3. Whether Claims 7, 10 and 17-19 are properly rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Halpin and Hoke in view of U.S. Patent No. 5,190,592 to Chazee et al. (hereinafter “Chazee”).

4. Whether Claims 8 and 9 are properly rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Halpin et al. and Hoke in view of U.S. Patent No. 6,583,638 to Costello et al. (hereinafter “Costello”).

VII. ARGUMENT

1. Claims 1-4, 10-16, 21, and 32-36 were improperly rejected under 35 U.S.C. 103(a) and are patentable over Halpin in view of Hoke.

Halpin is generally directed to a process chamber that includes a system of multiple gas ports, which are characterized as being critical for providing improved gas flow through

the described process chamber. Generally, the process chamber as described includes an inlet port, a primary outlet port, a first side outlet port and a second side outlet port. The side outlet ports are opposite each other and approximately 90 degrees from the inlet and primary outlet ports. It should also be noted that Halpin describes the use of a gas injector (see Halpin, Col. 11, ll., 16-21) for injecting the gases into the inlet port. The gas injector injects gases in a direction transverse to the longitudinal direction of the flow of gases from the inlet port to the outlet ports.

Hoke is generally directed to a horizontal metallorganic chemical vapor deposition reactor vessel (MOCVD) including an elongated rectangular shaped processing chamber. To obtain its desired flow pattern, Hoke employs a baffle plate disposed adjacent to the inlet port to allegedly increase uniformity and decrease turbulence of a vapor stream flowing through the chamber. A block is also disposed within the chamber, which is positioned between the baffle plate and a substrate support assembly. The chamber itself includes a rather spacious interior region to house the baffle plate, block, substrate support, and also provides a space intermediate the exhaust portion and the support. A RF coil is disposed about the external periphery of the process chamber and provides inductive heating of the substrate during operation thereof.

To establish a *prima facie* case of obviousness, the Examiner must meet the burden of establishing (1) that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references; (2) that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made; and (3) that all elements of the claimed invention are disclosed in the prior art. *In re Vaeck*, 947 F. 2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Under the first element, to establish *prima facie* obviousness of a claimed invention, the proposed modification cannot render the prior art unsatisfactory for its intended purpose. If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the

proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

In each one of Applicants' independent claims, the claimed reactor assembly comprises, *inter alia*, first and second sidewall openings that define an entire flow path of the gas and/or the reactant flow into and out of the process chamber. In contrast, Halpin teaches and suggests a process chamber that includes a multiple port system, i.e., an inlet port, a primary main port, a first side outlet port, and a second side outlet port. These ports are necessary so as to provide "improved gas flow". In fact, Halpin in its detailed description labels a section as "Inlets and Outlets for Improved Gas Flow" (see Halpin at Column 10, line 33), using the plural form to characterize "outlets". Immediately after the section heading, Halpin discloses that "[t]he preferred chamber provides improved gas flow distribution by employing **multiple ports** (emphasis added), (see Halpin at Col. 10, ll. 34-35). Specifically, the outlet ports are "symmetrically distributed in the chamber to facilitate uniform, laminar flow, and reduce recirculations." (see Halpin, Col. 10, ll. 39-41). If Halpin were modified to have first and second sidewall openings that define the entire flow path of the gas and/or the reactant flow into and out of the process chamber as claimed by Applicants, the intended purpose of Halpin would be destroyed. Halpin is explicit in its teachings that their process chambers have multiple outlet ports to provide the desired gas and/or reactant flow through the process chamber. Halpin's intended purpose is to have the gases spread out across the wafer being processed. The proposed modification with Hoke to minimize the multiple outlet ports to a single main outlet and a single inlet would render the Halpin invention unsatisfactory for its intended purpose and runs counter to that taught by Halpin as essential. For example, according to Halpin:

[b]y providing side gas outlets 26 and 28, in addition to the main gas outlet 24, gas distribution within the chamber can be controlled to provide gas flow toward the sides of the chamber where side outlet ports are located, as well as generally downstream direction toward the main outlet.

(Halpin, Col. 14, ll. 43-48)

Furthermore, by improving gas flow in this manner, the chamber 10 can be made more compact than previously designed chambers because the reactant gases do not require additional space to spread out toward the

sides of the chamber before reaching then wafer.

(Halpin, Col. 14, ll. 51-55)

Thus, modifying the multiple outlet ports (which is a critical necessity to the gas flow properties provided by Halpin's multiple outlet port process chamber and is also what Halpin teaches as a whole) in the manner suggested by Hoke would render the Halpin invention unsatisfactory for its intended purpose.

Moreover, it is well known that if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teaching of the references are not sufficient to render the claims *prima facie* case obvious. *In re Ratti*, 270 F. 2d 810, 123 USPQ 349 (CCPA 1959). Clearly, modifying the process chamber as taught by Halpin in the manner proposed by a combination with the Hoke reference would change the principle of operation. Halpin teaches and suggests a process chamber having multiple outlet ports to provide a desired laminar flow pattern into and out of the process chamber as well as provide flow toward the sides of the chamber. By modifying Halpin to have a single outlet port would necessarily change the principle of operation. No longer would gas flow be provided towards the sides of the chamber where the side outlet ports are located. Thus, it would be expected based on the teachings of Halpin provided as a whole that uniformity would suffer if the process chamber were limited to a single outlet. Moreover, it would no longer be feasible, based on the teachings provided therein, to provide a process chamber having a compact design because now additional space would be required to allow the lateral flow of the gases. Hoke, doesn't appreciate this problem since it is a MOCVD with ample space within the interior region of its elongated process chamber. For at least these reasons alone, the cited combination of Halpin with Hoke does not establish a *prima facie* case of obviousness against Claims 1-4, 6, 7, 10-16, 21, and 32-36.

With regard to the second element required to establish *prima facie* obviousness, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. Here, there is no reasonable expectation of success. The primary reference, Halpin, teaches

and suggests a multiple outlet port process chamber that includes a primary main outlet port, a first side outlet port, and a second side outlet port. The proposed modifications to Halpin would result in a markedly different process chamber that would not enjoy the benefits disclosed by utilizing a process chamber with the side outlet ports. As noted in Halpin, the side outlet ports are critical to its desired gas flow properties. Halpin suggests the elimination of the main outlet port in some embodiments, but always requires two or more side outlet ports at a minimum so as to provide gas flow toward the sides of the chamber (see Halpin, Col. 12, ll. 38-53). Thus, by modifying Halpin as proposed by the Examiner based on the teachings provided by Hoke would drastically change the flow properties through the process chamber and it is unlikely to have any reasonable expectation of success given the complexities in establishing a laminar flow pattern within a compact design and with uniformity.

Moreover, in applying Section 103, the U.S. Court of Appeals for the Federal Circuit has consistently held that one must consider both the invention and the prior art “as a whole”, not from improper hindsight gained from consideration of the claimed invention. See, *Interconnect Planning Corp. v. Feil*, 227 U.S.P.Q. 543, 551 (Fed. Cir. 1985) and cases cited therein. According to the *Interconnect* court:

[n]ot only must the claimed invention as a whole be evaluated, but so also must the references as a whole, so that their teachings are applied in the context of their significance to a technician at the time - a technician without our knowledge of the solution.

Id. Also critical to this Section 103 analysis is that understanding of “particular results” achieved by the invention. *Id.* The present rejection fails to consider Halpin “as a whole” and is improperly relying on hindsight for the basis of the rejection. It is well known patent law, that when the Section 103 rejection was based on selective combination of the prior art references to allegedly render a subsequent invention obvious, “there must be some reason for the combination other than the hindsight gleaned from the invention itself.” *Id.* Stated in another way, “[i]t is impermissible to use the claimed invention as an instruction manual or

‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.” *In re Fritch* 23 U.S.P.Q.2d 1780, 1784 (Fed. Cir. 1992).

As a whole, Halpin teaches the use of multiple ports to provide a uniform flow in its process chamber. Halpin’s teaching of multiple ports in process chambers has been ignored. Likewise, the teachings provided by Hoke as a whole have been ignored. Hoke is generally directed to a rectangular shaped interior region, wherein a baffle plate is disposed adjacent to an inlet to increase uniformity and decrease turbulence of a vapor stream flowing through the chamber. A block is disposed within the chamber, which is positioned between the baffle plate and a substrate support assembly. The baffle plate is required so that a desired laminar flow pattern for Hoke’s particular reactor vessel configuration can be established. Disregarding the teaching of the baffle plate to provide its desired laminar flow, as proposed by the Examiner in his combination of Hoke with Halpin, would likely render Hoke’s MOCVD reactor unsatisfactory for its intended purpose. With regard to the necessity of the baffle plate Hoke comments that:

[t]he baffle 12 is here used to diffuse an incoming vapor through inlet 14, to increase the laminar flow characteristic of said incoming vapor stream. The gas diffusing baffle 12 has a plurality of apertures or small holes 12a disposed therethrough. The holes 12a may be disposed in a pattern or random arrangement. Here the holes 12a are disposed in an ordered grid arrangement. During growth, vapor enters the reactor vessel 10 via the reactor inlet 14 (which is connected to tube portion 40g of vapor apparatus 35 of FIG. 2) at a high flow rate, approximately 10 liters/minute for example. At such flow rate, pressure builds up in the inlet area 15, behind the gas diffusing baffle 12, resulting in gas flow through all of the plurality of holes 12a of the gas diffusing baffle 12 thus providing a substantially laminar gas flow. As mentioned above, the inlet area 15 is linearly tapered; however, due to the diffusion of the gas by the baffle 12 once pressure has built up in the inlet area 15, the effect of the shape of such inlet area 15 on the uniformity of the resulting gas flow, is believed to be relatively insignificant. The gas diffusing baffle 12 and the inlet area 15 in which vapor pressure builds, prevent the gas from streamlining along the center of the rectangular chamber 11. Thus, to insure laminar flow by use of the baffle 12, it is believed to be sufficient to provide any shaped inlet area 15 between the inlet 14 and the baffle 12. Such area will prevent streamlining of the vapor through the baffle 12. Thus, the

baffle 12 is disposed adjacent to but spaced from the inlet 14 of the reactor vessel 10. In applications where the width of the chamber 11 is increased due to an increase in the substrate 63 size, but the size of the inlet 14 remains the same, the streamlining effect will be more significant, emphasizing the importance of such a baffle 12.

(Hoke, carryover paragraph of Cols. 7-8, Emphasis added)

Thus, without the baffle plate, the laminar flow characteristics of the incoming vapor stream would deleteriously decrease. As such, any combination of references that include the teachings provided by Hoke would require the use of the baffle plate adjacent to the inlet portion. Applicants' claimed reactor assembly is free of a baffle plate at the inlet. The Examiner is believed to be using the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious, which is clearly improper.

Purportedly, motivation for combining these two particular references was to combine Hoke's flow shaping portion with Halpin's manifold assembly to arrive at Applicants' claimed invention (see Office Action dated June 20, 2005, page 14, 117-11). Clearly, Hoke's flow shaping portion includes the baffle plate at the inlet portion as well as the block disposed between the baffle plate and a substrate to be processed. This is what Hoke teaches as a whole as it relates to the flow-shaping portion. Since Halpin is directed to a markedly different process chamber of a compact design, it is submitted that the flow shaping portion would not fit within the confines of Halpin's process chamber as described. In view of the foregoing, it is submitted that the Examiner is improperly relying on hindsight by taking selected portions of Hoke's flow shaping portion and combining this with selected portions of Halpin's inlet manifold assembly to purportedly arrive at Applicants' claimed invention.

Finally, with regard to the third element that is required to establish *prima facie* obviousness, it is submitted that all features of the claimed invention are not disclosed in the prior art. In each one of Applicants' independent claims, the claimed reactor assembly comprises, *inter alia*, first and second sidewall openings that define the entire flow path of the gas and/or the reactant flow into and out of the process chamber. Halpin fails to teach or

suggest this feature and for reasons previously discussed, modification in accordance with the teachings provided by Hoke, is clearly improper. Moreover, even if Halpin were modified to provide the claimed flow path, Hoke teaches a flow shaping portion that includes the use of a baffle plate. Applicants claimed reactor assemblies are free of a baffle plate. Therefore, because all of the elements of independent claims 1 and 32 are not taught in Halpin, or Hoke, there is no *prima facie* obviousness.

In view of the foregoing, it is therefore respectfully submitted that the rejection to Claims 1-4, 6, 7, 10-16, 21, and 32-36 is improper and is requested to be withdrawn.

2. Claim 5 was improperly rejected under 35 U.S.C 103(a) and is patentable over Halpin and Hoke in view of the STIC translation of JP 02-152251 to Takagi.

Claim 5 is dependent on the reactor assembly of Claim 1, wherein a bottom wall of the base unit is adapted to be stackedly attached to a second reactor assembly.

Halpin and Hoke are discussed above.

Takagi is generally directed to a vertical semiconductor manufacturing system that includes multiple vertically stacked process chambers. Pairs of process chambers are piled along the vertical direction to minimize the clean room footprint. Takagi fails to compensate for any of the deficiencies resulting from the combination of Halpin and Hoke as noted above.

Moreover, it is noted that Hoke teaches wrapping an RF coil about its process chamber such that the stacking of multiple process chambers would be prevented. Still further, the drive mechanism in Hoke for the rotating support is positioned underneath the process chamber. The drive mechanism requires a drive shaft (see Hoke, Figure 4, Ref. No. 22) to effect rotation of the support platen. Thus, the drive mechanism as suggested by Hoke would also prevent stacking multiple process chambers. Again, it is believed that the Examiner is improperly relying on hindsight by picking and choosing various elements as he deems fit. In view of these differences, a combination of the cited references would fail to

establish a *prima facie* case of obviousness and would likely not provide any reasonable expectation of success.

Favorable reconsideration of Claim 5 is requested.

3. Claims 7, 10 and 17-19 were improperly rejected under 35 U.S.C 103(a) and are patentable over Halpin and Hoke in view of Chazee.

Halpin and Hoke are discussed above.

Chazee is generally directed to an aerosol injection system. The aerosol injection system produces composite layers by the pyrolysis of solutes on heated substrates traveling in the muffle of a furnace. The furnace is described as having a parallelepipedic vertical case, which is used for channeling aerosol from its arrival at the top down to its base. The Examiner relies on Chazee to purportedly teach Applicants' claimed exhaust assembly as defined in dependent claims 7, 10, and 17-19.

Applicants first traverse the rejection on the grounds that Chazee is non-analogous art. For the purposes of evaluating obviousness of claimed subject matter, the particular references relied upon must constitute "analogous art". *In re Clay*, 966 F.2d 656, 659, 23 U.S.P.Q.2d 1058, 1060-61 (Fed. Cir. 1992). The art must be from the same field of endeavor, or be reasonably pertinent to the particular problem with which the inventor is involved. *Id.* As noted above, Chazee discloses an aerosol injection system that includes flowing solutes within a furnace in a vertical direction. This is not from the same field of endeavor nor is it closely related to particular problem to which Applicants are involved.

Secondly, there is no motivation to combine this reference with Halpin and Hoke. Again, it is apparent that the Examiner is failing to consider the teachings provided in each reference as a whole and is improperly relying on hindsight using Applicant's claimed invention as a template. Chazee is directed to the vertical flow of solutes through its aerosol injection system. This is markedly different from Applicants claimed cross flow reactor assemblies that provide improved cross flow uniformity, among others.

4. Claims 8 and 9 were improperly rejected under 35 U.S.C 103(a) and are patentable over Halpin and Hoke in view of Costello.

Halpin and Hoke are discussed above.

Costello is generally directed to a temperature controlled wafer chuck system. Costello fails to compensate for any of the deficiencies of Halpin and Hoke discussed above.

In summary, Claims 1-21 and 32-36 are non-obvious over the art of record. For the reasons cited above, Appellants respectfully submit that all of the claims are allowable and the application is in condition for allowance. Appellants respectfully request reversal of the outstanding rejections and allowance of this application.

VIII. CLAIMS APPENDIX

1. (Rejected) A reactor assembly comprising:

a base unit;

a chuck assembly disposed in a cavity of the base unit, wherein the chuck assembly comprises a support having a surface capable of receiving a substrate;

a process chamber comprising a top wall, a bottom wall, and sidewalls extending therefrom substantially perpendicular to the support surface of said chuck assembly, and a cylindrical opening extending through the bottom wall to the top wall defining a substantially cylindrically shaped interior region having a central axis extending substantially perpendicular to the support surface of said chuck assembly, wherein the process chamber is coupled to the base unit;

an inlet manifold assembly in fluid communication with a first sidewall opening of the process chamber in a selected one of the sidewalls, wherein the inlet manifold assembly comprises a flow-shaping portion adapted to laterally elongate a gas and/or a reactant flow into the process chamber, wherein the fluid communication between the inlet manifold assembly and the first sidewall opening of the process chamber is free from a baffle plate; and

an exhaust manifold assembly in fluid communication with a second sidewall opening of the process chamber in the sidewall diametrically opposed from the selected one of the sidewalls, wherein the first and second sidewall openings define an entire flow path of

the gas and/or the reactant flow into and out of the process chamber.

2. (Rejected) The reactor assembly according to Claim 1, wherein the flow-shaping portion of the inlet manifold assembly is adapted to introduce the gas and/or reactant flow into the process chamber at about a plane parallel to a surface of the substrate.

3. (Rejected) The reactor assembly according to Claim 1, wherein the flow-shaping portion is triangularly shaped.

4. (Rejected) The reactor assembly according to Claim 1, wherein the top wall of the process chamber is removable.

5. (Rejected) The reactor assembly according to Claim 1, wherein a bottom wall of the base unit is adapted to be stackedly attached to a second reactor assembly.

6. (Rejected) The reactor assembly according to Claim 1, wherein the exhaust manifold assembly is adapted to receive the gas and/or reactant flow from the process chamber at about a plane parallel to the surface of the substrate.

7. (Rejected) The reactor assembly according to Claim 1, wherein the exhaust manifold assembly comprises an exhaust receiving portion and a flow restrictor, wherein the flow restrictor is affixed to an opening of the exhaust receiving portion and is adapted to restrict the gas and/or reactant flow through the opening from the process chamber into the exhaust receiving portion.

8. (Rejected) The reactor assembly according to Claim 1, wherein the support of the chuck assembly comprises a means for regulating a temperature of the substrate.

9. (Rejected) The reactor assembly according to Claim 1, wherein the support further comprises a resistance heating element and a cooling passage.

10. (Rejected) The reactor assembly according to Claim 1, wherein the support of the chuck assembly is stationary and non-rotating.

11. (Rejected) The reactor assembly according to Claim 1, wherein the inlet manifold assembly further comprises a flow restrictor attached to an opening of the flow-shaping portion.

12. (Rejected) The reactor assembly according to Claim 1, wherein the top wall is substantially transparent to a light source.

13. (Rejected) The reactor assembly according to Claim 1, wherein the top wall is substantially transparent to a UV light source.

14. (Rejected) The reactor assembly according to Claim 1, wherein the top wall is substantially transparent to an infrared light source.

15. (Rejected) The reactor assembly according to Claim 1, wherein the process chamber includes a third sidewall opening in the sidewall adjacent to the first and second sidewall openings, wherein the third opening is sized for transporting the substrate into an interior region of the process chamber.

16. (Rejected) The reactor assembly according to Claim 1, further comprising a baffle plate disposed about an opening of the flow-shaping portion.

17. (Rejected) The reactor assembly according to Claim 7, wherein the exhaust receiving portion is triangularly shaped.

18. (Rejected) The reactor assembly according to Claim 7, wherein the flow restrictor comprises a plate having at least one passageway.

19. (Rejected) The reactor assembly according to Claim 7, wherein the flow restrictor comprises a rectangularly shaped plate having a length dimension greater than a height dimension, wherein the passageway is disposed in an area less than or equal to about one half of the height dimension.

20. (Rejected) The reactor assembly according to Claim 7, wherein the flow restrictor comprises anodized aluminum.

21. (Rejected) The reactor assembly according to Claim 1, wherein the inlet manifold assembly is adapted to introduce the gas and/or reactants at about a plane parallel to a surface of the substrate and the exhaust manifold assembly is adapted to exhaust the gas and/or reactants at about a plane parallel to a surface of the substrate.

22-31. (Canceled)

32. (Rejected) A reactor assembly comprising:

a base unit;

a chuck assembly disposed in a cavity of the base unit, wherein the chuck assembly comprises a support having a surface capable of receiving a substrate;

a process chamber comprising a transparent top wall, a bottom wall, and sidewalls extending therefrom, and a cylindrical opening extending through the bottom wall to the top wall to define a substantially cylindrically shaped interior region, wherein the process chamber is coupled to the base unit;

a light source assembly in operable communication with the transparent top wall for projecting radiation into the process chamber;

an inlet manifold assembly in fluid communication with a first sidewall opening of the process chamber in a selected one of the sidewalls, wherein the inlet manifold assembly comprises a flow-shaping portion adapted to laterally elongate a gas and/or a reactant flow into the process chamber, wherein the fluid communication between the inlet manifold assembly and the first sidewall opening of the process chamber is free from a baffle plate; and

an exhaust manifold assembly in fluid communication with a second sidewall opening of the process chamber in the sidewall diametrically opposed from the selected one of the sidewalls, wherein the first and second sidewall openings define an entire flow path of the gas and/or the reactant flow into and out of the process chamber.

33. (Rejected) The reactor assembly of Claim 32, wherein the light source assembly comprises a housing and a light source.

34. (Rejected) The reactor assembly of Claim 32, wherein the top wall comprises a quartz material.

35. (Rejected) The reactor assembly of Claim 32, wherein the exhaust manifold assembly is adapted to receive the gas and/or reactant flow from the process chamber at about a plane parallel to a surface of the substrate.

36. (Rejected) The reactor assembly of Claim 32, wherein the transparent top wall is removable.

IX. EVIDENCE APPENDIX

There is no evidence submitted pursuant to 37 C.F.R. §1.130, 37 C.F.R. §1.131, or 37 C.F.R. §1.132 or any other evidence entered by the Examiner and relied upon by the Appellant in this appeal, known to the Appellants, Appellants' legal representatives, or assignee.

X. RELATED PROCEEDINGS APPENDIX

There are no other related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

In the event the Examiner has any queries regarding the submitted arguments, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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